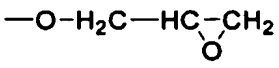
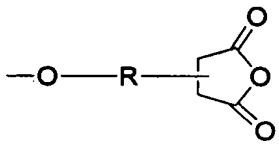
WHAT IS CLAIMED IS:

1. A method of forming a negative pattern of carbon nanotubes, wherein the method comprises the steps of:

(a) dispersing carbon nanotubes in an organic solvent with one or more photoacid or photobase generator to provide a liquid coating composition, wherein surfaces of the carbon nanotubes are modified with an oxirane group of formula (1) and/or surfaces of the carbon nanotubes are modified with an anhydride group of formula (2), (3), (4), (5), (6) or (7):

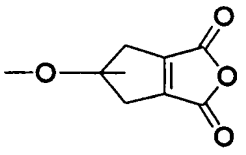


(1);

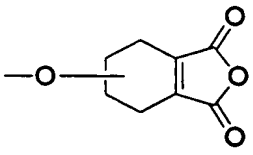


(2);

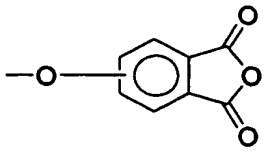
wherein, R is C_{1-15}, linear, branched or cyclic alkylene;



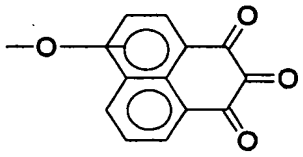
(3);



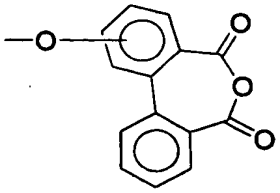
(4);



(5);



(6);



(7);

(b) applying the liquid coating composition onto a substrate and evaporating the organic solvent by prebaking to deposit a coating film on the substrate;

(c) exposing the coating film to UV light through a photomask having a desired pattern to induce photopolymerization of the surface-modified carbon nanotubes in exposed areas of the coating film; and

(d) developing the exposed coating film with an organic developer to remove unexposed areas of the coating film, resulting in a negative pattern of carbon nanotubes.

2. The method according to claim 1, wherein the liquid coating composition comprises 3-95wt% of the carbon nanotubes and 0.1-15 parts by weight of the photoacid or photobase generator based on 100 parts by weight of the carbon nanotubes.

3. The method according to claim 1, wherein the liquid coating composition further comprises 0.3-2 parts by weight of a photo intensifier based on 100 parts by weight of the carbon nanotubes, wherein the photo intensifier is one or more selected from the group consisting of 2-ethyl-9,10-dimethoxyanthracene, 9,10-dichloroanthracene, 1-chloro-anthracene, 2-methylanthracene, 9-methylanthracene, 2-t-butylanthracene, anthracene, 1,2-benzanthracene, 1,2,3,4-dibenzanthracene, 1,2,5,6-dibenzanthracene, 1,2,7,8-dibenz-anthracene, 9,10- dimethoxydimethylanthracene, 2-ethyl-9,10-dimethoxyanthracene, N-methylphenothiazine, and isopropylthioxanthone.

4. The method according to claim 1, wherein the organic solvent used in step (a) is one or more selected from the group consisting of DMF, 4-hydroxy-4-methyl-2-pentanone, ethylene glycol monoethyl ether, 2-methoxyethanol, methoxypropylacetate, ethyl-3-ethoxy-propionate, and cyclohexanone.

5. The method according to claim 1, wherein the liquid coating composition further comprises 0.1-10 parts by weight of a coupling agent based on 100 parts by weight of the carbon nanotubes, wherein the coupling agent is one or more selected from the group consisting of aminopropyltriethoxysilane, phenylaminopropyltrimethoxysilane, ureidopropyltriethoxysilane, glycidoxypropyltrimethoxysilane, isocyanatopropyltriethoxysilane, isopropyltriisostearoyltitanate, and acetoalkoxyaluminium diisopropylate.

6. The method according to claim 1, wherein the liquid coating composition further comprises 1-95 parts by weight of an oxirane group-containing monomer, oligomer or polymer, and/or an anhydride group-containing monomer, oligomer or polymer to 100 parts by weight of the carbon nanotubes.

7. The method according to claim 1, wherein the liquid coating composition further comprises 1-30 parts by weight of a polymer binder based on 100 parts by weight of the carbon nanotubes, wherein the polymer binder is one or more selected from the group consisting of polyester,

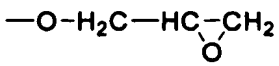
polycarbonate, polyvinylalcohol, polyvinylbutylal, polyacetal, polyarylate, polyamide, polyamideimide, polyetherimide, polyphenyleneether, polyphenylenesulfide, polyethersulfone, polyetherketone, polyphthalamide, polyethernitrile, polybenzimidazole, polycarbodiimide, polysiloxane, polymethylmethacrylate, polymethacrylamide, nitrile rubber, acryl rubber, polyethylenetetrafluoride, epoxy resin, phenol resin, melamine resin, urea resin, polybutene, polypentene, ethylene-propylene copolymer, ethylene-butene-diene copolymer, polybutadiene, polyisoprene, ethylene-propylene-diene copolymer, butyl rubber, polymethylpentene, polystyrene, styrene-butadiene copolymer, hydrogenated styrene-butadiene copolymer, hydrogenated polyisoprene, and hydrogenated polybutadiene.

8. The method according to claim 1, wherein the method further comprises a step of post curing the exposed coating film after step (c).

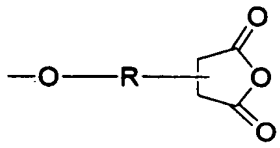
9. A method of producing a polymerized carbon nanotube composite, wherein the method comprises the steps of:

(a) dispersing carbon nanotubes in an organic solvent along with one or more thermal hardener to provide a liquid coating composition, wherein surfaces of the carbon nanotubes are modified with an oxirane

group of formula (1) and/or surfaces of the carbon nanotubes are modified with an anhydride group of formula (2), (3), (4), (5), (6) or (7):

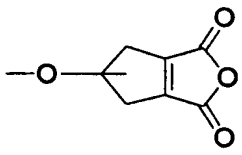


(1);

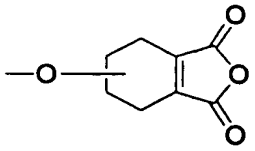


(2);

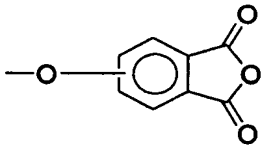
wherein, R is C_{1-15}, linear, branched or cyclic alkylene;



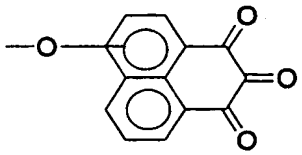
(3);



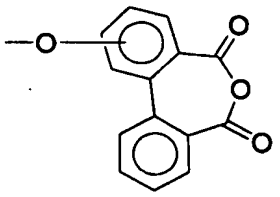
(4);



(5);



(6);



(7);

(a) applying the liquid coating composition onto a substrate and heatcuring to provide a polymerized carbon nanotube composite.

10. The method according to claim 9, wherein the liquid coating composition comprises 3-95wt% of the carbon nanotubes and 1-35 parts by weight of the thermal hardener based on 100 parts by weight of the carbon nanotubes.

11. The method according to claim 9, wherein the organic solvent used in step (a) is one or more selected from the group consisting of DMF, 4-hydroxy-4-methyl-2-pentanone, ethylene glycol monoethyl ether, 2-methoxyethanol, methoxypropylacetate, ethyl-3-ethoxypropionate, and cyclohexanone.

12. The method according to claim 9, wherein the liquid coating composition further comprises 0.1-10 parts by weight of a coupling agent based on 100 parts by weight of the carbon nanotubes, wherein the coupling agent is one or more selected from the group consisting of

aminopropyltriethoxysilane,
phenylaminopropyltrimethoxysilane,
ureidopropyltriethoxysilane,
glycidoxypropyltrimethoxysilane,
isocyanatopropyltriethoxysilane,
isopropyltriisostearoyltitanate, and acetoalkoxyaluminium diisopropylate.

13. The method according to claim 9, wherein the liquid coating composition further comprises 1-95 parts by weight of an oxirane group-containing monomer, oligomer or polymer, and/or an anhydride group-containing monomer, oligomer or polymer.

14. The method according to claim 9, wherein the liquid coating composition further comprises 1-30 parts by weight of a polymer binder based on 100 parts by weight of the carbon nanotubes, wherein the polymer binder is one or more selected from the group consisting of polyester, polycarbonate, polyvinylalcohol, polyvinylbutylal, polyacetal, polyarylate, polyamide, polyamideimide, polyetherimide, polyphenyleneether, polyphenylenesulfide, polyethersulfone, polyetherketone, polyphthalamide, polyethernitrile, polybenzimidazole, polycarbodiimide, polysiloxane, polymethylmethacrylate, polymethacrylamide,

nitrile rubber, acryl rubber, polyethylenetetrafluoride, epoxy resin, phenol resin, melamine resin, urea resin, polybutene, polypentene, ethylene-propylene copolymer, ethylene-butene-diene copolymer, polybutadiene, polyisoprene, ethylene-propylene-diene copolymer, butyl rubber, polymethylpentene, polystyrene, styrene-butadiene copolymer, hydrogenated styrene-butadiene copolymer, hydrogenated polyisoprene, and hydrogenated polybutadiene.

15. A negative pattern of carbon nanotubes prepared by the method according to claim 1.

16. A polymerized carbon nanotube composite prepared by the method according to claim 9.